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ABSTRACT

Costing principles are applied to a university by estimating unit costs and their component factors for the university's different inputs, activities, and outputs. The information system used is designed for Fribourg University but could be applicable to other Swiss universities and could serve Switzerland's universities policy. In general, it should improve forecasting, decision making, and the monitoring of results in the management of higher education establishments at local and national levels. It should especially lead to quantifying an important factor in university discussions: the cost of a place occupied by a student or research worker at the different levels of the different courses of study or lines of research. The system of analysis involves student record cards, time budget allocation cards, cards showing costs of elementary units of activity, and indirect costs--all used for computerized data processing. (LBH)

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Programme on Institutional Management
in Higher Education

ANALYSIS OF UNIT COSTS IN A UNIVERSITY

The Fribourg Example

by

Jacques Pasquier and Matthias Sachse

Second General Conference of Member Institutions

(Paris, 20th-22nd January, 1975)

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Note by the Secretariat

As part of the co-operative research work under the CERI Programme on Institutional Management in Higher Education, a group of seven French universities took on the task, as from the beginning of 1973, of calculating the overall and unit costs to the economy of the teaching, administrative and research work done by universities, and in the same year two Belgian universities (the Université Catholique de Louvain and the Université de Liège) and a Swiss university (Fribourg) decided to take part in the group's work. They undertook investigations which, while based on the French universities' methodological proposals, departed from them in some respects, because their theoretical options were different and they had hardly comparable organisational structures and different problems of immediate concern.

This report is an interim account of the methodological and numerical studies carried out by Fribourg University. Although the treatment of information for calculating unit costs has many features in common with the work of the French group, it differs in two important respects, namely the kind of information sought and the treatment of teaching activity. This diversity of methodological options can only enrich the discussions and help all the universities concerned to solve their own difficulties in this field.

The Centre for Educational Research and Innovation (CERI) wishes to express its sincere gratitude to the authors of this report, Professor J. Pasquier and Mr. M. Sachse, and also to the Fonds National Suisse de la Recherche Scientifique which helped to finance the work done by the Fribourg University team.

INTRODUCTION

This report attempts to apply costing principles to a university by estimating unit costs and their component factors for the university's different inputs, activities and outputs. It is part of the "Unit Costs" Project of the French language group.

The information system used is designed for Fribourg University and, if widened and adapted, should be applicable to other Swiss universities also, in which case it could serve Switzerland's universities policy. In general it should improve forecasting, decision-making and the monitoring of results in the management of higher education establishments at local and national level. More particularly it should lead to quantifying a very important factor in university discussions in this country, namely the cost of a place occupied by a student or a research worker at the different levels of the different courses of study or lines of research.

In this exercise the Fribourg team has departed from the other French-speaking universities on important points of methodology. This is due to differences in theoretical options and also to the fact that Swiss university policy operates with special instruments and objectives within structures which are difficult to compare with those of the other countries in the project, especially France. The following account must therefore include a description of the methodology.

In addition the research work was only started in April, 1973, which was later than in the other universities in the project, and the resources employed are very limited, consisting of one research worker and the project leader, so that the results given below cannot be considered as by any means final. They should be regarded as no more than test results and as illustrating a method. In any case they cover only one university year, the year 1972-73, and a sample representing between one-quarter and one-third of Fribourg University. Moreover, the work has not passed the stage of a retrospective enquiry.

1. STRUCTURAL CONTEXT AND METHODOLOGICAL OPTIONS

1.1. The University of Fribourg

The University of Fribourg has a special place in Switzerland because of the bilingual and highly international composition of its students and teachers and it will be useful to describe how it fits into the Swiss university framework.

The latter comprises relatively small units. Switzerland has ten universities and in 1971-1972 the number of students per university ranged from 1,300 to 9,100 with an average of 4,400. In this respect Fribourg comes seventh in size with 3,150 students.

The small size of Swiss universities enables their administration to be very decentralised and much of this work is done by the teachers. Central administration personnel appears to average about 55 persons per establishment and to range from 12 to 190 persons. Four universities, including Fribourg, are reported to employ less than 20 persons on their central administration work.

Of Switzerland's ten universities, two come under the Confederation, while the eight others come under the cantonal authorities and are subsidised by the central government. The two federal universities are technical and concentrate on applied research and the training of engineers, but the cantonal universities cover all the main fields of knowledge, except one which specialises in economics and management.

Fribourg University is one of the multi-discipline cantonal universities and at present its various disciplines are grouped in four traditional faculties which may be ranked by student numbers as follows:

	number of students	
	winter 71-72	winter 72-73
arts	1,180	1,256
law and economics	958	1,013
natural sciences and medicine	722	677
theology	281	284
TOTAL	3,141	3,230

In the 1972-1973 winter semester there were the following numbers of teachers; 140 professors of different grades, including assistant professors, and 287 middle-grade teachers, likewise of varying qualification levels, including assistant lecturers.

The university's expenditure for the calender year 1972 was 24,350,000 Swiss francs.

Although this university is relatively small, the present report will deal only with one of its departments, namely the Faculty of Law and Economics, which includes slightly over 30 per cent of all the students.

1.2. Requirements of university policy in Switzerland

The centres of decision-making on university policy in Switzerland say they require to know both normative costs (what the costs "should be") and expected costs (the costs which are more or less "sure" to arise). This report is limited to providing a body of information on actual costs in the recent past and, although they are retrospective costs, they must be known for calculating normative and expected costs.

In calculating normative costs this information will be required in order to evaluate how costs would be affected by the various options proposed in inter-disciplinary discussions and ultimately by the political authorities, while in calculating expected costs it will serve to provide the basic data, since serious forecasting can only be based, at least partially, on a study of the past, and this applies also to forecasting as a tool for planning.

These objectives also require very detailed information which the system proposed in this report endeavours to provide and its results should also make it easier to compare actual costs so as to detect former management mistakes and to evaluate the consequences of any decision affecting costs.

The requirements are not so different from those which, for example, French universities must satisfy, but there is a difference due to the structural patterns with which this report has to deal. There are wide differences of structure between Swiss universities, more so than, for example, between French universities, so that a costing system had to be found which could be adapted to the particular structures of the universities concerned and also to their own theoretical options.

The Fribourg team embarked alone on this enquiry, limiting its observations to its own university and not pretending to work out a system valid for the whole country. However, negotiations are afoot for continuing the work in co-operation and on a basis of equality with other interested Swiss universities, so that the system presented here may later be considerably altered.

1.3. Types of information sought

There are several methods of obtaining information and several degrees of detail for each method. How should one choose between them? In the interests of economy one should obtain the information whose utilisation value compares most favourably with the cost of obtaining it.

How is this optimum to be found? A possible research task would be to draw up a comparative table of all the ways of obtaining information and their respective economic merits, but the problem of unit costs in universities is too recent and too vast and the resources of research teams are too small to allow of this approach, so that one has to make an a priori choice.

In this case it is easy to start by eliminating all the information which is of no direct or indirect use for decision-making, after which one can only hope to find the optimum by intuition, trial and error. The French universities team seems to have chosen maximum detail as their starting point, whereas the Fribourg team has concentrated on simplicity and low cost.

Each of these approaches starts from one of the two possible extremes and in the absence of a better criterion for choosing a starting point they are both equally justifiable, but the Fribourg approach lends itself better to the situation in Switzerland. By starting with a very simple system which requires to be refined, one facilitates discussion with the other universities and adaptation to their structures and options, although it should not be concluded that the approach followed in this report can be applied only to Switzerland, as its flexibility makes it suitable for general use.

1.4. Time budget allocation(1)

The need for simplicity is met in allocating the time of academic personnel between their various activities, namely:

- teaching, research and administration;
- courses and holidays;
- first, second and third cycle courses;
- number of hours spent giving courses;
- hours per week in theory and in practice;
- share of each teacher belonging to a given elementary unit of education and research (see definition under Section 2 below).

This allocation is of course of major importance owing to the share of university expenditure taken by teaching personnel.

All the calculations are governed by a basic assumption, which is that at a given level all the sub-sectors of activity are united or interdependent.

There is primarily a theoretical justification for this assumption, while from a practical point of view it appears to be the only realistic one to adopt for information purposes and decision-making.

Theoretical justification

For a given time budget allocation, the sub-sectors are for the most part either inseparable from one another or else they complete each other or are in opposition to each other, so that in allocating a time budget between teaching and research one cannot separate activities such as required reading, congresses and contacts, and directing advanced students' research work. Otherwise teaching and research work are usually complementary, as the professor makes use of his research findings in preparing his courses, while the continual synthesising and memorising involved in giving them helps him in his research work. Most activity combining teaching and research shows these features, so that it is difficult to agree that the two functions are separated and independent, as is assumed by most of the earlier studies on the subject.

Practical justification

Even if the above theoretical justification were not acceptable, it would hardly be realistic to try to estimate the time budget allocation empirically, even by using a probability distribution. The studies by Sachse on this question have given quite clear results (they are to be published) and the problem is more how to deal with high degrees of uncertainty. Apart from the difficulty of obtaining the information, there is its uselessness for decision-making. It is generally agreed that one should only seek information which is useful for decision-making, but it is not clear what kind of decision-making on university policy could be assisted by information on the allocation of the time budget for academic personnel between the sub-sectors mentioned above.

As in physics, so in economics, one has to agree that there are unmeasurable phenomena and to accept the consequences. The Fribourg team therefore proposes a series of approaches corresponding to the sub-sectors mentioned above. All of them involve a pattern of information of extreme simplicity, for example, research and administration are counted as teaching

1) A paper giving more details may be consulted by persons interested in this subject (apply to the project leader, Jacques Pasquier, professeur à l'Université de Fribourg, Séminaire d'économie d'entreprise, rue de Lausanne 55, 1700 Fribourg).

unless these two items are programmed and financed separately(1). In the same way only the overall activity of an elementary teaching and research unit has been considered and no attempt has been made to distinguish the activities of its different components (save in exceptional circumstances, see 2.3.1 below).

That both these approaches are sound is shown by the fact that, except for separately programmed and financed research or administrative tasks, all university policy decisions affecting costs are classified under teaching, as is done in almost all other universities on the Continent.

A decision which affects costs is a decision to create, maintain or abolish a teaching post, because for a long time such a decision will involve the salaries of the professor, his assistants and secretaries, as well as the cost of premises, teaching materials, books, etc. This set of costs corresponds to what will be defined later as an elementary unit of activity (see introduction to Section 2 below).

Apart from those cases in which research and administration are programmed and financed separately, it is clear that professors are engaged mainly to fill teaching posts. It is true that research is the main criterion of the quality of their teaching and the one which will certainly be most important in choosing between several candidates, but a professor justifies his existence by his teaching and not by his research work. Why? No matter how research is defined, no reliable forecast can be made of its output, nor can definite a posteriori information be obtained on the output or work done (except in rare cases and after a long time lag), but this is much less so in the case of teaching. In view of the joint nature of teaching and research, the decision to appoint a professor at most European universities is taken by the political authorities mainly because of the teaching to be done.

If, however, decision-making depends on the teaching to be done, how is its output to be measured? It would again be vain to try to obtain details of each type of instruction given, including the time spent on advising advanced students on the preparation of their theses. As regards decisions affecting costs, what matters is whether a professor has a full-time, half-time or quarter-time programme, in what salary bracket he falls, and so on. To be sure, a professor may not provide all the teaching shown in his programme, but in other sectors of the economy labour costs are calculated in the same way, whether a workman is lazy or diligent. If he is diligent, he will produce more and the unit cost will go down. As teaching output manifests itself in the form of graduates or drop-outs and the work which produces it is measured by a programme of lectures, exercises, laboratory courses, etc., the units making up the programme could be taken as a measure of teaching output, but no means are seen of breaking down this output into the work done by a professor and that done by his assistant or his secretary.

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1) This does not mean that no attempt will be made to calculate the cost of research. Although it has not yet been calculated at this stage of the investigation, the intention is to calculate it later, but only for research which is financed and programmed separately, and by using an approach based on marginal costs.

2. SYSTEM OF ANALYSIS

The information system hinges on the elementary unit of activity (U.E.A.)(1) which, for the purposes of this report, is defined as the set of activities (teaching, research and administration) connected causally with a teacher-researcher who makes independent decisions. It should be noted that this definition does not cover the same set of activities as the U.E.A. adopted by the French universities in their enquiries, nor does it fit the basic units in traditional universities, such as the professorial chair, or agree with the administrative definitions used at Fribourg or elsewhere in Switzerland. According to the traditional administrative concepts held today, a work supervisor, lecturer or assistant professor are not independent units. However, they can be so regarded for decision-making purposes, in which case their work should be treated in this report as being done within an independent U.E.A. The first step is to try to assign all costs to this elementary unit of activity, after which one can calculate factor costs and the costs of activities and output.

In order to make the system still more adaptable, the information is computerised, which makes it possible whenever necessary to test how sensitive the results are to variations in the uncertain items of information. This type of data processing should also facilitate comparison between universities and satisfy more fully the wide range of users' requirements.

For the sake of clarity, however, the following analysis is based on manual data processing with the use of card indexes. There are four main categories of cards; "student" record cards, "time budget allocation" cards, "U.E.A. costs" cards, and indirect costs cards. Moreover, in order not to burden the description, the methodological developments are confined to those aspects of the enquiry system which correspond to results given in this report (see Section 3 below).

2.1. "Student" record cards (see Table 1)

For each student there is a card on which are first entered the details of the courses taken by the student during the semester in question. Later, a figure will be entered for the cost of each of these courses. It will then be possible to calculate from the card what it costs to provide the student with the whole (or any sub-division) of his syllabus for the semester or year, or for the duration of his studies.

The problem here is the quality of the basic information, in other words, how to answer the question "what student is taking what course?", and in this connection the situation varies widely between universities, depending mainly on how much compulsion there is on the student to enrol and attend courses, and also on the information systems used. For the purposes of this report, there are two extreme systems between which lies a whole range of variants.

At one extreme is an absolute obligation for a student to enrol for each course of study and attend it, with arrangements for reporting full details of what he does to the

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1) Unité Elémentaire d'activité.

central administration. This is the position, for example, at United States universities. Some time before the beginning of a semester, the student enrols for the various courses he chooses, but is allowed a certain time to alter the details. This information is continuously computerised and passed on to the professor and he checks attendance at his course, which is compulsory for the student, up to the end of the semester. Such a system provides almost complete information on "what student is taking what course".

The same cannot be said of the European-type systems of academic freedom to which Fribourg University belongs. Students at this university have so far been enrolling for courses directly with the professor and giving him course enrolment forms with various statistical information for his own use. The difficulty in using these forms is that some students do not, or not regularly, attend all the courses for which they have enrolled. As a result, and this is a further difficulty in making use of the forms, the professors pay little attention to them and one cannot be sure that they have all been handed in.

In view of these difficulties, course enrolment forms were not used for this report, but were replaced by an information survey carried out by the central administration during general enrolment at the university at the beginning of a semester. The survey operates via what is called the enrolment card, which may be regarded as an abstract of a student record card.

An enrolment card is shown in Table 1. The last piece of information requested by this card concerns the courses which the student intends to follow during the coming semester. These courses are indicated by code numbers given in the programme of courses, in which they serve to identify a unit of contact (U.C.). A unit of contact is defined as the equivalent of a sub-division of the teaching given by a professor within the programme of courses. The first three figures of the code identify the professor and the fourth figure identifies the sub-division of the instruction he gives.

Table 1 - Enrolment Card

7	3	-	2	0	5	-	3	6	1

Swiss registration number

H	I	L	B	U	R	N										

Family name

W	A	L	T	E	R											

Christian name

State here how many semesters you have spent in your branch of study (including the present semester)

	2

In what language will most of your courses be given?

0 German

x French

State here all the courses you will take this semester. You will find the four-figure code in the programme before each course. (These particulars are requested solely for statistical purposes).

Example:

3 0 1 - 4			
3 2 7 - 1	202.67	2	Law studies administration expenses
3 0 2 - 1	182.06	2	19 x 3 = 57.-
3 0 7 - 1	134.65	2	Central administration expenses
3 5 2 - 1	41.95	2	294.-
3 5 2 - 2	38.46	1	Cost of use of computer facilities
3 0 9 - 1	111.81	2	19 x 1.50 = 28.50
3 0 9 - 2	248.78	2	
3 0 4 - 1	401.07	4	Direct costs
3 0 3 - 1	139.27	2	1,500.72
-	1,500.72	19	Unit costs 1,880.22

The survey was made on this basis for the 1974 summer semester after making a trial survey in the summer of 1973 covering only the Faculty of Law and Economics. It covered the whole of the university except candidates for a doctorate and "auditeurs"(1); these categories of student are therefore not included in the groups covered by the results which are discussed below.

The figures are probably too high for two reasons. First, a student's ideas may change between the time when he fills in the card and the beginning of the courses. Secondly, in European-type universities it is well known that courses are not attended by anywhere near all the students who have enrolled for them. To deal with this difficulty it is intended, by way of a check, to complete the information by making a survey at the time of enrolment for the following semester, using the courses book which each student has to have signed by the professor once or twice a semester. At the present stage of the enquiry this survey could not yet be made. The information it provides will be added to the enrolment cards and it will not be decided how to interpret the differences between the two sets of information and what basis to use for subsequent research until the actual figures are seen.

As students choose most of their courses to suit the examinations for which they are working, it is almost always possible to tell from an enrolment card for what degree a student is studying and what stage he has reached.

2.2. "Time budget allocation" cards (see Table 2)

One of these cards is made out for each U.E.A. To understand it one should look at each of the columns in Table 2 in turn. As already explained (see Section 1.4 above), the activity in a U.E.A. is seen as a whole and calculated from the units of contact (U.C.'s).

1) Students who are entitled to attend lectures, but not to sit for the corresponding examinations.

Table 2

"Time budget allocation" card (a hypothetical example)

Code number	Position in the syllabus (in semesters)		Hours per week		Amount assigned to the semester	Distribution co-efficient
	German(1) 1 2 3 4 5 6 7 8	French(1) 1 2 3 4 5 6 7 8	in the programme	proportion		
371-1	x x		2	0.33	0.5	0.166
371-2	x x		2	0.33	0.5	0.166
371-3	x x x x		2	0.33	0.5	0.166
			6	1.0		

(1) Language of instruction.

Code number

See 2.1 above.

Position in the syllabus

This heading covers a complex pattern because of the different languages of instruction, whence the two sub-headings "German" and "French". Owing to the almost completely bilingual character of the university, a breakdown must be made by language of instruction, especially between French and German, and it is of special interest in this report to compare the costs of the different disciplines in the French and German streams.

From the columns may be seen, for each language, at what stage in the syllabus the teaching in question is being given, in other words, to what students of what semester. For example, course 371-1 is being given to students of the first and second semesters studying in German, and so on. As may be seen, the syllabi for the faculty concerned last a maximum of eight semesters. As already stated in Section 2.1, they include only studies below doctorate level.

Hours per week

(a) in the programme

This column shows in absolute figures the theoretical number (given in the programme of courses) of hours of instruction per week corresponding to each code number, i.e. to each unit of teaching contact. For example, unit 1 is given two hours per week. The total hours per week given in the last line of the column shows the total teaching load on the professor.

(b) as a proportion

This column shows the amount of each distinct piece of instruction given as a proportion of the total hours per week of all teaching done by the professor. In practice this figure is obtained by dividing the number of hours of instruction in question per week by the total number of hours' instruction given by the professor.

It seems preferable to proceed in this way rather than to add up all the hours of instruction actually given by a professor during a semester. This is because one would have then to allow for the fact that professors do not all begin or finish a semester at the same time and that some courses may be interrupted by holidays, sickness, attendance at congresses, etc., so that the cost of obtaining all these details would not seem to be worth the results they would yield.

Amount assigned to the semester

The number and nature of a professor's courses may vary from one semester to another and so may students' attendance at them, so that it is worth while to calculate costs per semester rather than costs per year, and in any case this does not prevent one from calculating the costs per year afterwards.

The problem is that at Fribourg, like other Swiss universities, the winter semester is much longer than the summer semester, but it was nevertheless decided to split the costs 50-50 between the winter and summer semesters, because one may assume a certain unity over time in a professor's work and indeed it would be illogical not to do so whilst assuming other things such as that teaching and research are united activities. Thus the work which a professor does in the winter semester benefits the courses he gives in the summer semester, while the work he does in his four holiday months benefits both his summer semester and his winter semester courses. Meanwhile, if a sensitivity analysis is required or this assumption is altered, there is no reason why one should not choose different coefficients, such as 0.65 for the winter semester and 0.35 for the summer semester.

Distribution coefficient

This is given by multiplying the two preceding columns, e.g. 0.33 x 0.5 = 0.166. The coefficient is the conclusion reached by the Table and will be used for most of the subsequent calculations.

2.3. Cards showing costs of elementary units of activity

These cards show all the costs connected with an elementary unit of activity and are supported by a number of sub-cards, for personnel costs and fixed asset costs.

2.3.1. Personnel cost cards (see Table 3)

Here again the contents of Table 3 have to be explained column by column.

Table 3

Personnel cost cards (a hypothetical example)

Code number	Salaries and wages				Students	Cost of unit of contact Fr	Cost per student Fr
	Professors	Assistants	Secretaries	Others			
	40,000	20,000	1,000				
371-1	6,640	3,320			5	9,960	1,982
371-2	6,640	3,320			5	9,960	1,982
371-3	6,640	3,320	500		3	10,460	3,688

Code number

See 2.2 above.

Wages and salaries

The top line shows the total annual wages and salaries of all staff who are directly connected with an elementary unit of activity. The figures come from the Directorate of Education in the Canton of Fribourg and show the amounts before deduction of taxes and contributions to the AVS (compulsory insurance for old age and surviving spouse), but they include all social insurance contributions payable by the employer (to the Pension Fund or AVS). All figures on this card are for the calendar year, as is the university budget. The present report takes the figures for 1972. Each column may give the total of the salaries of several persons.

The lines opposite the different code numbers show in each column the result of multiplying the figure in the top line by the distribution coefficients in Table 2. For example, 40,000 x 0.166 = 6,640 francs, which means that for giving course 371-1 in the summer semester, Professor 371 cost 6,640 francs.

Exceptions may be made to this allocation rule whenever a person is completely attached to a unit of contact, as sometimes happens in the case of assistants, in which case the salary is entered in full on the appropriate line without using the "proportion" coefficient. Thus supposing that the 20,000 on the top line of the "assistants" column in Table 3 was for only one person employed entirely on course 371-1, the 20,000 would not be multiplied by the distribution coefficient 0.166. Only the column "amount assigned to the semester" in Table 2 would be counted and in line 371-1 of the "assistants" column there would be only 20,000 x 0.5 = 10,000.

Students

This means the number of students enrolled for a course or attending it and is given by the enrolment card (see Table 1). There are, for example, 5 students in course 371-1.

Cost of a unit of contact

This means the cost in personnel of each unit of teaching contact per semester and is arrived at by adding up each line, e.g. line 371-1 gives 6,640 + 3,320 = 9,960.

This procedure assumes that costs are linear throughout the different stages of a course of study, i.e. that for a single U.E.A. the costs of one hour of teaching contact in the first year are the same as in the fourth year, which is another aspect of the time budget allocation problem already discussed. The assumption may be queried, but no more satisfactory solution could be found. In order to state that a one-hour lecture by the same professor is worth more in the fourth year than in the first year one would have to prove that the former required more time to prepare than the latter. While a fourth year course requires more knowledge, does the first year course not require more teaching skill? Should a university not concentrate its best efforts on the first years? If it is agreed that there is a difference between the two, what criterion does one choose for measuring it? In the absence of a political or administrative decision on the matter, no solution is seen other than the one adopted in this report.

Cost per student

This is the cost of a unit of teaching contact per student and per semester. A calculation is made for each line by dividing the column "cost of unit of contact" by the column "students", so that the cost per student of course 371-1 was 9,960 ÷ 5 = 1,992 francs for the summer semester.

2.3.2. Fixed asset costs cards

A separate card is kept for expenditure on books, offices and laboratories, furniture and lecture rooms, and it is here that this study falls farthest short of the methodology which it is intended to apply(1).

The intention is to use similar methods of evaluation and amortization to those given in the theoretical textbook used by the French universities in the project. The evaluation of land and buildings would include financial costs and opportunity costs, but there would be a choice of methods of amortizing. In the case of books, offices and laboratories, and furniture the amount would be assigned again to the elementary unit of activity and then

1) A paper giving more details and numerical examples may be consulted by persons interested in this subject (apply to the project leader, see footnote to Section 1.4).

to the unit of contact and so on to the student, as for personnel, but in the case of lecture rooms the amount would first be assigned to the unit of contact, then to the elementary unit of activity and so on to the student.

Unfortunately at this stage in the study it has not yet been possible to evaluate the costs of the buildings, so that the figures for lecture rooms include only maintenance costs. Meanwhile expenditure on the other categories has been lumped together without amortization, which in theory is hardly permissible, but in practice the consequences are not too serious, since fixed asset costs are after all but a small proportion of the total.

2.4. Indirect costs cards

By indirect costs are meant those costs which cannot be assigned directly to an elementary unit of activity. They are of two kinds, according to whether they depend on a student's attendance at the university.

2.4.1. Indirect costs depending on attendance

The following categories of expenditure are considered in this report as depending on attendance:

(a) amortization of the areas for common use and the installations on them. These areas are defined as the total university area less the areas allocated for the different levels of administration, for particular elementary units of activity and for lecture rooms. They include entrance halls, corridors, toilets, libraries, reading rooms, restaurants, bars, etc;

(b) maintenance and operational expenditure on the areas for common use and the installations on them, i.e. cleaning, heating, lighting, water supply, and library and restaurant staff.

Except for the university central library, it has only been possible to include the second category of expenditure at this stage in the enquiry and it appears in the results under Section 3.

These indirect costs are charged to the student in proportion to the number of hours of instruction for which he has enrolled. In practice one adds up the number of hours for each semester shown on each student record card and then finds the total for all the cards for the whole university, which gives the total number of student hours per semester at the university. From this the following equation results:

$$\text{indirect cost per semester per hour of attendance} = \frac{\text{total indirect costs per semester which depend on attendance}}{\text{total student hours per semester for the whole university}}$$

To calculate the costs for only a branch of the university, such as the Faculty of Law and Economics, the exercise is repeated, putting the costs in question as the numerator and the total of student hours per semester in the faculty as the denominator.

These figures are now entered on each student record card and multiplied by the number of hours shown on it for the semester in question. The result is an indirect cost per hour of attendance during the semester of 10 francs for the university as a whole, 5 francs for the faculty, and 12 hours of instruction, so that the student is assigned 120 francs + 60 francs = 180 francs. Other branches also may be analysed, but this report deals with the Economics and Law streams.

2.4.2. Fixed indirect costs

These costs are independent of attendance and arise simply because there are students, irrespective of the number of hours of instruction for which they enrol.

They comprise administrative expenditure, namely:

- central administration (= A);
- gate porters (= B);
- faculty secretariat (= C_1, C_2, C_3, C_4).

Experience shows that there is little change in these items as a result of changes in the level of student attendance.

The costs are entered on the student record cards using the following formula:

$$\text{fixed cost assigned to each student at the university} = \frac{A + B}{\text{total number of students at the university}}$$

If the expenditure is only for a branch of the university, e.g. administrative expenditure on the Faculty of Law and Economics, a similar formula is used, thus:

$$\text{fixed cost assigned to each student in the Faculty of Law and Economics} = \frac{C_2}{\text{total number of students in the Faculty}}$$

3. RESULTS

As already stated, these are only initial results which are still incomplete (see Introduction, 2.3.2 and 2.4 above). Moreover, and more important, the calculations are based on figures for the calendar year 1973 (divided by 2 to give figures for each semester), but on data from the student cards for the summer semester of 1974. At this stage in the enquiry it would therefore be dishonest to suggest making a decision on the basis of such results.

The foregoing methodology gives Table 4, which shows for each elementary unit of activity the totals in Table 3 and in similar Tables for fixed asset costs and indirect costs (see 2.3.1, 2.3.2 and 2.4 above). The elementary units of activity were chosen at random and their numbers were deliberately altered to avoid any breach of confidence.

From these figures one can obtain costs, summed to the desired level:

(a) for the different factors (different categories of personnel, books, offices, equipment, lecture rooms and laboratories, etc.);
(b) for the different activities (courses, exercises, research, etc.);
(c) for the different outputs (graduates or drop outs, research results, etc.).

The following paragraphs give some examples of these possibilities. As in the other Tables in this paper, values are given in Swiss francs. They all apply to the Faculty of Law and Economics which comprised 872 students during the period in question, of whom 308 were in the Law stream and 564 in the Economics stream.

3.1. Factor costs

A university's factors of production are defined as all the resources which contribute to its work, i.e. the various categories of personnel and physical resources, and a knowledge of them may be of importance for a programming policy and in planning recruitment and fixing remuneration.

In this connection Table 5 gives only aggregate figures for reasons which will be readily understood. The figures for assistant professors and guest professors are less significant, because these groups are so small.

3.2. Activity costs

Activity costs are of special importance for programming policy, both at national level and at university level or below, and they are now available for all elementary units of activity in the faculty in the form given in Table 4.

Expressed in aggregate figures, they are given here in a realistic form per syllabus semester, broken down by subject of study (Law or Economics) and language of instruction. Two Tables have been compiled, one covering direct costs (Table 6) and the other covering total costs (Table 7).

For the sake of simplicity the figures for indirect costs are not given.

3.3. Output costs

Leaving aside the research work which has not yet been started at this stage of the enquiry, one can define the university's output as a student who leaves the university with a degree or any other evidence of having received instruction. The university's intermediate output would then be represented by a student who had completed a part of the syllabus for a degree, such as one semester. Information on these points can be valuable for programming studies and especially for financial policy (for fixing subsidies, enrolment fees and course fees).

In this connection the system used here enables one to obtain any information, whether in terms of the individual student or summed to the desired level. Table 1, which intentionally uses hypothetical figures so as not to disclose confidential information, gives a figure for the cost per student per semester. It is the cost of an intermediate output and can now be calculated for the 872 students covered by this enquiry. When the system has been used long enough, this information will be available for the whole career of each final output and will enable any desired total or sub-total to be calculated.

Meanwhile Table 8 gives a total cost per student under the sub-heads already used for activity costs, from which may be calculated the intermediate output of a given semester in the various sub-divisions, while the last column of the Table ("TOTAL") gives an idea of the cost of a final output.

Table 4. Realistic examples of synoptic tables of costs of a U.E.A.*

PROF.NO.371	SAL.PROF.	SAL.ASS.	SAL.SECR.	SAL.OTHERS	SALARIES	TOTAL COSTS	HOURS	STUDENTS	COSTS PER STUDENT
	73712.00	15000.00	0.00	0.00	88712.00	90485.00	7	340	
COURSE 1	10530.29	2142.86	0.00	0.00	12673.14	12926.43	2	71	182.06
COURSE 2	10530.29	2142.86	0.00	0.00	12673.14	12926.43	2	96	134.65
COURSE 3	10530.29	2142.86	0.00	0.00	12673.14	12926.43	2	95	136.07
COURSE 4	5265.14	1071.43	0.00	0.00	6336.57	6463.21	1	78	82.86

PROF.NO.372	SAL.PROF.	SAL.ASS.	SAL.SECR.	SAL.OTHERS	SALARIES	TOTAL COSTS	HOURS	STUDENTS	COSTS PER STUDENT
	74975.00	40095.00	0.00	0.00	115070.00	116570.00	9	499	
COURSE 1	8330.56	4455.00	0.00	0.00	12785.56	12952.22	2	93	139.27
COURSE 2	8330.56	4455.00	0.00	0.00	12785.56	12952.22	2	141	91.86
COURSE 3	4165.28	2227.50	0.00	0.00	6392.78	6476.11	1	91	71.17
COURSE 4	4165.28	2227.50	0.00	0.00	6392.78	6476.11	1	81	79.95
COURSE 5	8330.56	4455.20	0.00	0.00	12785.56	12952.22	2	47	275.58
COURSE 6	4165.28	2227.50	0.00	0.00	6392.78	6476.11	1	46	140.79

PROF.NO.373	SAL.PROF.	SAL.ASS.	SAL.SECR.	SAL.OTHERS	SALARIES	TOTAL COSTS	HOURS	STUDENTS	COSTS PER STUDENT
	73628.00	0.00	0.00	0.00	73628.00	75401.00	8	92	
COURSE 1	18407.00	0.00	0.00	0.00	18407.00	18850.25	4	47	401.07
COURSE 2	18407.00	0.00	0.00	0.00	18407.00	18850.25	4	45	418.89

*SAL = Salary; PROF = Professor; ASS = Assistant; SECR = Secretary;

The "SALARIES" column is the total of the preceding columns, and the difference between the "Total Costs" column and the "SALARIES" column represents expenditure other than personnel costs.

Table 5. Maximum, minimum and average costs per U.C. and per student depending on status of teacher in U.C.

	Status of teacher in U.C.				
	Ordinary (full-time) Professor	Extraordinary (part-time) Professor	Assistant Professor	Chargé de cours (lecturer) or Established Teacher	Guest Professor
Average number of U.C.s per U.E.A.	4.0	3.5	4.0	1.5	2.5
Total cost per U.C.					
average	10091	10625	9424	3860	5999
maximum	28171	12496	12632	13402	12048
minimum	1651	5269	6316	1137	3250
Cost per student per U.C.					
maximum	3002	290	202	643	322
minimum	38	72	72	.21	50

Table 6. Total direct costs of syllabus per semester, by branch of study and language of instruction*

LAW STUDIES	SEMES. 1	SEMES. 2	SEMES. 3	SEMES. 4	SEMES. 5	SEMES. 6	SEMES. 7		* TOTAL *
FRENCH LANGUAGE	30425	30425	18100	39967	30198	30198	30198		209513
GERMAN LANGUAGE	28909	28909	12791	43632	61355	66891	55818		298304
* TOTAL *	59334	59334	30891	83599	91553	97089	86016		507816

ECONOMICS STUDIES	SEMES. 1	SEMES. 2	SEMES. 3	SEMES. 4	SEMES. 5	SEMES. 6	SEMES. 7	SEMES. 8	* TOTAL *
FRENCH LANGUAGE	60343	60343	53224	53224	82639	82639	71857	71857	536126
GERMAN LANGUAGE	56712	56712	63073	63073	47884	47884	40407	40407	416151
* TOTAL *	117055	117055	116297	116297	130523	130523	112264	112264	952277

FACULTY	SEMES. 1	SEMES. 2	SEMES. 3	SEMES. 4	SEMES. 5	SEMES. 6	SEMES. 7	SEMES. 8	* TOTAL *
FRENCH LANGUAGE	90769	90769	71324	93192	112837	112837	102055	71857	745639
GERMAN LANGUAGE	85620	85620	75863	106705	109239	114775	96225	40407	714455
* TOTAL *	176389	176389	147188	199896	222076	227612	198280	112264	1460094

* See 2.3.1. above.

Table 7. Synopsis of all costs of syllabus per semester, by branch of study and language of instruction*

LAW STUDIES	SEMES. 1	SEMES. 2	SEMES. 3	SEMES. 4	SEMES. 5	SEMES. 6	SEMES. 7		TOTAL*
FRENCH LANGUAGE	5231	23596	10367	70175	13725	33373	39668		196449
GERMAN LANGUAGE	6779	83859	2051	73910	16820	76732	69603		330047
TOTAL*	12010	107454	12438	144085	30545	110105	109271		526497

ECONOMIC STUDIES	SEMES. 1	SEMES. 2	SEMES. 3	SEMES. 4	SEMES. 5	SEMES. 6	SEMES. 7	SEMES. 8	TOTAL*
FRENCH LANGUAGE	294	131794	40794	127028	35033	94139	48383	170743	848808
GERMAN LANGUAGE	4272	106674	37370	103280	41766	114247	34531	103014	545105
TOTAL*	4566	238469	78164	230308	76799	208386	82915	273787	1193394

FACULTY	SEMES. 1	SEMES. 2	SEMES. 3	SEMES. 4	SEMES. 5	SEMES. 6	SEMES. 7	SEMES. 8	TOTAL*
FRENCH LANGUAGE	5525	155390	51181	197203	48758	127512	88051	171037	844658
GERMAN LANGUAGE	11051	190533	39421	177189	58586	190979	104135	103338	875232
TOTAL*	16575	345923	90602	374393	107344	318492	192186	274375	1719890

* Being total of Table 6 plus fixed asset costs and indirect costs (see 2.3.2 and 2.4. of the report).

Table 8. Total cost per student, per semester of his syllabus, by branch of study and language of instruction*

LAW STUDIES	SEMES. 1	SEMES. 2	SEMES. 3	SEMES. 4	SEMES. 5	SEMES. 6	SEMES. 7		* TOTAL *
FRENCH LANGUAGE	333	1212	1679	1658	1332	1467	588		8269
GERMAN LANGUAGE	151	1485	1635	1784	1960	1715	1122		9852
* TOTAL *	214	1412	1672	1717	1825	1632	867		9139

ECONOMICS STUDIES	SEMES. 1	SEMES. 2	SEMES. 3	SEMES. 4	SEMES. 5	SEMES. 6	SEMES. 7	SEMES. 8	* TOTAL *
FRENCH LANGUAGE	0	1669	1387	1359	1577	1319	1836	1424	10571
GERMAN LANGUAGE	1768	2066	1872	2252	2814	2209	2494	1980	17455
* TOTAL *	1768	1828	1586	1664	2095	1711	2068	1599	14320

FACULTY	SEMES. 1	SEMES. 2	SEMES. 3	SEMES. 4	SEMES. 5	SEMES. 6	SEMES. 7	SEMES. 8	* TOTAL *
FRENCH LANGUAGE	333	1582	1440	1454	1501	1355	1010	1424	10100
GERMAN LANGUAGE	341	1782	1858	2045	2515	1987	1401	1980	13910
* TOTAL *	338	1685	1598	1684	1942	1683	1196	1599	11726

* Table 7, divided by the number of students enrolled in each sub-section.

4. CONCLUSION

This information system is based on actual figures rather than on averages. It covers all items and not only samples, so that by using a simple and flexible methodology one can obtain very close results. These features are of value, not only for Switzerland, but also in a wider context. This is also the case of the information system described in this paper.

These advantages are obtained at the price of repeating a large number of identical operations and, as the data used are simple and may often have other uses also, there is a data-processing problem which calls for a computer.

In this connection the main difficulty is not one of data programming so much as of organising the flows of information from the various administrative bodies concerned and in this respect Swiss universities are in much the same situation as most European-type universities, so that there is still a big job to be done.